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IOS PRESS

2018

Peltonen , L-M , Junttila , K & Salanterä , S 2018 , Nursing Leaders' Satisfaction with Information Systems in the Day-to-Day Operations Management in Hospital Units . in AK Rotegård , DJ Skiba , S Barbosa & AGD Alcazar (eds) , NURSING INFORMATICS 2018: ICT TO IMPROVE QUALITY AND SAFETY AT THE POINT OF CARE . Studies in Health Technology and Informatics , vol. 250 , IOS PRESS , pp. 203-207 , International Congress on Nursing and Allied Health Informatics (NI) , Guadalajara , Mexico , 06/06/2018 . <https://doi.org/10.3233/978-1-61499-872-3-203>

<http://hdl.handle.net/10138/303884>

<https://doi.org/10.3233/978-1-61499-872-3-203>

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Nursing Leaders' Satisfaction with Information Systems in the Day-to-Day Operations Management in Hospital Units

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Abstract

Information usage in the day-to-day operations management of hospital units is complex due to numerous information systems in use. The aim of this study was to describe and compare nurse leaders' satisfaction with information systems used in the day-to-day operations management in hospital units. The design was a cross-sectional survey with five questions rated from one (disagree) to five (fully agree). The response rate was 65 % (n = 453). Respondents reported fair satisfaction with how information systems support decision-making (median 4, IQR 3–4) and improve ease of access to information (median 4, IQR 3–4). However, respondents were less satisfied with how systems improve speed of access to information (median 3, IQR 3–4). Nor did respondents think that systems were developed for them (median 3, IQR 2–4). Respondents further reported needing numerous systems daily to support decision-making (median 4, IQR 3–5). A clear need for one system, which would gather important information for display was stated (median 5, IQR 4–5). Work experience, gender and time when overseeing the unit were associated with some aspects related to satisfaction. In conclusion, information system improvements are needed to better support the day-to-day operations management in hospital units.

Keywords:

Hospitals, Information Systems, Organization and Administration

Introduction

The day-to-day operations management of units in hospitals is characterised by frequent *ad hoc* decisions needed when allocating available staffing and material resources to meet patient care needs [1,2]. The day-to-day operations are run by selected professionals in each hospital unit. The first-line nurse leader, that is, the nurse who is responsible for the nursing day-to-day operations management of a unit, can be called by many names, such as head nurse, ward sister, ward manager, nursing unit manager [3,4], ward leader [4], nurse manager, assistant nurse manager, clinical nurse manager, front-line nurse leader, front-line nurse manager, and first-line nurse manager [3]. Additionally, the terms shift charge nurse [3], charge nurse or shift leader [2] can be used. Usually, a nurse manager is responsible for the unit at day time, but at evenings, nights and weekends selected staff nurses oversee the unit [5].

Traditionally, nursing leaders have both administrative responsibilities, such as human resource management and financial management, as well as clinical responsibilities such

as ensuring the adequacy of staff and the quality of care [6,7]. But differences in managerial activities have been reported for office hours and the time beyond. Those in managerial position, who most often work during normal office hours, make more often decisions concerning staffing and material resources when compared to staff members, who often work in a leader's position beyond office hours, who more frequently make decisions related to patient flow and placement [5]. In general, managerial activities in the day-to-day operations management can be divided into six areas [5]:

- decisions related to patient flow and placement,
- decisions related to the number and placement of personnel,
- decisions related to material resources,
- negotiations with stakeholders to coordinate care,
- guidance of staff members, and
- the redressing of grievances.

Hospital first-line nursing leaders' work is challenged by constant interruptions [1,6] and information, which is scattered in numerous places [8,9,10]. In distinction to strategic decision-making, the day-to-day operations management requires much real-time information [1,8,10,11,12]. Information systems have been expected to enhance performance of health care services [13], but still up to two-thirds of information system implementation projects end up having problems with meeting their goals [14]. Previous research shows dissatisfaction with hospital information systems reported by different professionals. Nurses, physicians, administrative staff and other users of hospital information systems have reported a clear need for system improvements and dissatisfaction with current information systems regarding usability, layout of output, data exchange, connectivity, and database access [15].

Previous research has presented potential opportunities with the implementation of management information systems as they for example have been shown to decrease costs related to better resource allocation [17,18]. Also, performance management information systems have showed to improve performance with real-time information about clinical data related to the medical care provided in the unit, which supports the monitoring and assessment of the performance of the unit [19]. But, research on systems, which provide financial and operational information related to hospital management, have reported interoperability issues, a lack in information quality and layout of output, and unfulfilled information needs [20]. Also, one study exploring the impact of electronic alerts for triage protocol showed only

small benefits in improving care processes at the point of care [21].

There is limited research regarding information systems developed to support nursing management, in specific related to the day-to-day operations management [16]. Nurse managers have reported that current information systems fail to support their decision-making sufficiently and that several information systems are used to support different managerial tasks, as information systems generally are developed to serve only one managerial function, such as human resource management, financial management, management of clinical information, or communication [10]. Additionally, nurse managers have reported dissatisfaction with

- the content of information systems, as information has been out of date, incorrect, lacking and segregated, as well as
- the use of information systems, which is related to problems with information availability and flow, problems with access, usability and technical issues, and a lack of long-term planning [10].

One previously suggested solution to solve problems related to data accuracy and timeliness is a data warehouse approach where information from different systems is brought together to support nursing management [22]. Also, preliminary models to combine information to support several managerial tasks have been suggested [23]. However, research on such systems in the clinical setting is yet scarce.

The digitalization of health care and recent technological advancements have the potential to support the day-to-day operations management in hospitals. However, research exploring nursing leaders' satisfaction with information systems when running the day-to-day operations in hospital units is scarce. Therefore, the aim of this study was to describe and compare nurse leaders' satisfaction with information systems used in the day-to-day operations management in hospital units.

Methods

Design, setting and sampling

The design was a national cross-sectional survey. Data was collected in three university hospitals and six central hospitals in Finland. These hospitals were chosen with stratified random sampling where the whole country was divided into three sections (north, central and south). One university hospital and two central hospitals were chosen from each of the three sections.

Respondents

The target group was all nurses who were responsible for the day-to-day operations management of a hospital unit. These units covered the acutely ill patients' care processes from the emergency department to the inpatient wards, including imaging, procedure and critical care units. Trauma, cardiac, gastrological and gastrosurgical, and neurological and neurosurgical patients were treated in these units. Outpatient clinics were excluded.

Data collection

Data were collected with a paper-based questionnaire in each hospital from the autumn of 2015 to the end of spring 2016. A local coordinator in each hospital was recruited to inform eligible nurses about the study, to assure informed consent and to distribute questionnaires and collect responses.

The data was collected with a short questionnaire consisting of six statements. The statements were the following: 1) current information systems support my decision-making, 2) current information systems improve ease of access to information, 3) current information systems improve speed of access to information, 4) current information systems are developed to support my work, 5) I use numerous information systems on a daily basis to support my decision-making, and 6) I would prefer to use one information system, which would gather all important information into one display. Each statement was rated on a Likert-type scale ranging from one to five (1 = disagree, 2 = somewhat disagree, 3 = neither agree nor disagree, 4 = somewhat agree, 5 = fully agree).

Data analysis

The statistical analyses were made with SPSS version 24 for Windows (IBM Corporation, NY, USA). Descriptive information about the reported satisfaction to each of the statements in the questionnaire are reported with medians and interquartile ranges (IQRs). Possible associations with respondents' characteristics and satisfaction statements are assessed with ordinal logistic regression. The results are presented with cumulative odds ratios (CORs) and confidence intervals (CIs).

Ethical aspects

An ethical statement was received from the Ethics Committee of the University of Turku (18/2014, 16/2015). Hospital administrative approvals for collecting data were obtained from all participating organizations. A returned questionnaire was considered as informed consent.

Results

Respondents' characteristics

A total of 65 % (n = 453) of the questionnaires were returned. A slight majority, 57 % (n = 258) of the respondents worked in central hospitals while 43 % (n = 195) worked in university hospitals. The unit sizes where the respondents worked varied. Units reporting the number of patient beds, such as critical care units and inpatient wards, had a mean of 24.2 (SD 10.5) beds while units that reported patients treated per day, such as the emergency department and the imaging unit, had a mean of 142.3 patients treated per day (SD 98.5). The majority, 91.5 % (n = 375) of the respondents were women and 8.5 % (n = 35) were men. Most respondents (58.7 %, n = 266) worked on inpatient wards, while 22.3 % (n = 101) worked in emergency departments, 9.7 % (n = 44) in imaging units, and 8.4 % (n = 38) on procedure units. The respondents' mean age was 45.8 years (SD 10.2). Their mean work experience was 20.6 years (SD 10.3) and their mean managerial work experience was 9.0 years (SD 7.3). Most of the respondents (49.4 %, n = 224) reported being responsible for the unit beyond normal office hours, and almost one third 30.7 % reported being responsible for the unit during normal office hours. The remaining 11.7 % (n = 53) reported being responsible for the unit both during normal office hours and beyond.

The respondents' satisfaction with current information systems

The respondents reported fair satisfaction with how current information systems support their decision-making (median 4, IQR 3–4). The respondents further reported that current information systems somewhat improve ease of access to information (median 4, IQR 3–4). However, the respondents were less satisfied with how information systems improve

speed of access to information (median 3, IQR 3–4). Nor did the respondents think that current information systems are developed to support them (median 3, IQR 2–4). The respondents reported that they need to use many information systems every day to support their decision-making (median 4, IQR 3–5) while they would prefer to only use one information system, which would gather all important information into one display (median 5, IQR 4–5).

Association of respondents' characteristics with satisfaction statements

Associations with respondents' characteristics and information system features are presented in Table 1. The table shows that the odds for female respondents were 2.16 times greater to report higher satisfaction with how current systems improve ease of access to information when compared to men.

Table 1 – Association with respondents' characteristics and information system features with adjusted cumulative odds ratios (CORs), confidence intervals (CIs) and p-values

| Characteristics of respondent | Information system feature | | | | | | | | | | | |
|-------------------------------|------------------------------------|---------|---|---------|--|-------|--|-------|--|----------|--|---------|
| | Systems support my decision-making | | Systems improve ease of access to information | | Systems improve speed of access to information | | Systems are developed to support my work | | Numerous systems are needed to support decision-making | | One system is needed to gather important information | |
| | Adjusted COR* (95 % CI) | p | Adjusted COR* (95 % CI) | p | Adjusted COR* (95 % CI) | p | Adjusted COR* (95 % CI) | p | Adjusted COR* (95 % CI) | p | Adjusted COR* (95 % CI) | p |
| Gender | | 0.265 | | 0.020** | | 0.061 | | 0.105 | | 0.159 | | 0.061 |
| Female | 1.46 (0.75-2.83) | | 2.16 (1.13-4.14) | | 1.83 (0.97-3.46) | | 1.70 (0.89-3.25) | | 0.62 (0.32-1.20) | | 0.49 (0.23-1.03) | |
| Male | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| Unit | | 0.845 | | 0.817 | | 0.316 | | 0.146 | | 0.067 | | 0.162 |
| Emergency department | 0.89 (0.40-2.0) | | 1.11 (0.49-2.48) | | 0.67 (0.30-1.47) | | 0.92 (0.42-2.00) | | 0.93 (0.43-2.04) | | 2.20 (0.95-5.06) | |
| Radiology department | 0.78 (0.32-1.91) | | 0.97 (0.40-2.31) | | 0.77 (0.32-1.83) | | 1.09 (0.46-2.58) | | 0.87 (0.36-2.10) | | 1.03 (0.42-2.53) | |
| Inpatient ward | 1.04 (0.52-2.10) | | 1.26 (0.62-2.56) | | 1.07 (0.53-2.15) | | 1.59 (0.79-3.19) | | 0.52 (0.26-1.05) | | 1.51 (0.73-3.13) | |
| Procedure unit | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| Time of day | | 0.544 | | 0.192 | | 0.596 | | 0.632 | | <0.001** | | 0.019** |
| Normal office hours | 0.87 (0.55-1.36) | | 0.75 (0.48-1.16) | | 0.89 (0.58-1.37) | | 0.90 (0.58-1.39) | | 2.54 (1.61-4.00) | | 1.78 (1.10-2.88) | |
| Beyond normal office hours | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| Type of hospital | | 0.089 | | 0.882 | | 0.670 | | 0.175 | | 0.303 | | 0.963 |
| University hospital | 1.45 (0.94-2.24) | | 1.03 (0.68-1.57) | | 1.09 (0.72-1.65) | | 0.75 (0.50-1.14) | | 1.25 (0.82-1.91) | | 0.99 (0.63-1.56) | |
| Central hospital | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |
| Work experience | | 0.017** | | 0.179 | | 0.061 | | 0.464 | | 0.892 | | 0.427 |
| 0-10 years | 0.40 (0.20-0.77) | | 0.53 (0.28-1.01) | | 0.43 (0.22-0.81) | | 0.63 (0.34-1.18) | | 0.98 (0.51-1.85) | | 1.22 (0.63-2.39) | |
| 11-20 years | 0.61 (0.33-1.11) | | 0.71 (0.39-1.30) | | 0.51 (0.28-0.94) | | 0.70 (0.39-1.26) | | 1.18 (0.66-2.12) | | 1.68 (0.89-3.17) | |
| 21-30 years | 0.38 (0.19-0.75) | | 0.54 (0.28-1.03) | | 0.52 (0.27-0.99) | | 0.64 (0.34-1.20) | | 1.15 (0.61-2.17) | | 1.34 (0.67-2.69) | |
| 31-41 years | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | |

COR = cumulative odds ratio, CI = confidence interval

* Adjusted for all other variables in the model

** Statistically significant (p < 0.005)

The odds for respondents responsible for a unit during normal office hours was 2.54 times greater to report a need for numerous information systems to support decision-making when compared to those responsible for a unit beyond normal office hours. Further, the odds for those responsible for a unit during normal office hours was 1.78 times greater to report a need to have one system to gather important information when compared to those responsible for a unit beyond normal office hours. When comparing the respondents work experience, the odds was greater for respondents with most work experience (31-41 years) to report higher levels of satisfaction with how current information systems support their decision-making when compared to those with less work experience (2.50 times greater when compared to respondents with 0-10 years of experience, 1.64 times greater when compared to respondents with 11-20 years of experience, and 2.63 times greater when compared to respondent with 21-30 years of experience). Other characteristics were not associated with the information system features.

Discussion

The latest technological developments have improved the quality of information systems in hospitals surprisingly little during the latest years from a user's perspective, as the respondents still reported moderate satisfaction with current information systems in a similar way as previously reported [10,15]. Therefore, more attention should be paid to the development, implementation and revising of current information systems to better support the day-to-day operations management in hospitals. In particular, incentives to improve information access and user centeredness as well as to reduce the number of information sources needed, as currently numerous sources are used to obtain important information [8,9,10]. Bringing important information from different information systems on display in one place [22, 23] has the potential to support decision-making better than current systems do, as current systems usually only serve one managerial task at a time [10,17,18,19]. Although, practical challenges with implementing such a system are expected, due to a common lack of interoperability between systems [24]. Fast and easy access to essential information may reduce the time used to seek information from several sources and speed up the decision-making processes. Attention should also be paid to the most effective ways to support managerial tasks as some information system features may be more effective than others [21].

The observed association between the time of day when the respondent was responsible for the unit and the facts that numerous systems are needed to support decision-making and that one information system is wanted to gather all important information for display, indicates that those working during normal office hours, usually unit managers [8], have more challenges with their information management when compared to those responsible for the unit outside of this time. Interestingly, those with the most work experience reported higher satisfaction with how current information systems support decision-making when compared colleagues with less experience. One reason might be that more experienced professionals may resort to tacit knowledge not yet obtained by their younger colleagues. This emphasizes the need for information system improvements that better support those with less experience. A third interesting finding was that male respondents were found more critical to how current systems improve ease of access to information. This is in line with previous research related gender and work satisfaction, which

has showed that female employees have higher levels of satisfaction when compared to men [25].

This study is limited by the few questions asked. A more thorough set of statements would have provided a more detailed description of the nursing leaders' satisfaction with information systems in the day-to-day operations management in hospital units. This study does however give an update on the current situation of satisfaction with information systems in general and new information about the present state of nursing leaders' satisfaction with contemporary information systems. Future work is needed to identify areas for prioritization of information system development, specific information needs of different users and how to best tailor information systems for nursing leaders who are responsible for the day-to-day operations management in hospital units.

Conclusions

This study aimed to describe and compare nurse leaders' satisfaction with information systems used in the day-to-day operations management in hospital units. The findings of the survey show only moderate satisfaction with current information systems for the respondents. Therefore, more attention is needed for the development of information systems to better support decision-making in the day-to-day operations management in hospital units. Especially, improvements in access to information and user centeredness as well as a reduction in the number of information sources currently used is needed. Easy access to important information is essential to support timely and accurate decisions in the pursuit of high quality decisions for optimal resource allocation and safe care provision.

Acknowledgements

The authors thank all nurses that responded to the survey, the nine coordinators from the hospitals and the data manager. This study received funding from the Finnish Work Environment Fund in Finland (the grant number: 114249).

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